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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/064,873	08/26/2002	Gopal B. Avinash	15-UL-6174	6172

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EXAMINER
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SETH, MANAV

ART UNIT	PAPER NUMBER
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2624

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Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No. 10/064,873	Applicant(s) AVINASH ET AL.	
	Examiner Manav Seth	Art Unit 2624	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 10 July 2006.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-32 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-32 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### **Continued Examination Under 37 CFR 1.114**

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on July 10, 2006 has been entered.

### **Response to Amendment**

2. Applicant's amendment filed on July 10, 2006 has been considered and entered in full.
3. Applicant's amendments with respect to respective claims have been considered but are moot in view of the rejection(s) made below.

### ***Claim Rejections - 35 USC § 112***

4. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. Claims 1-32 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter, which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The amendment filed July 10, 2006 presents the amendment to the claims, which recites "ultrasound image". The claims and specification defining applicant's invention as originally filed does not provide any support for the word "ultrasound" associated with the image. However, examiner does acknowledge the section "background of invention" which recites "In many applications, such as medical diagnostic imaging, images are saved with annotations burnt in" (para. 0002) and further provides an example of ultrasound imaging (para. 0003) but no support of further particularly processing the ultrasound images has been found in the claims and specification defining applicant's invention as originally filed. The applicant or inventor of the instant application, at the time the application was filed, had no possession of the invention as cited above in the section "background of invention" and further does not show any support of processing the ultrasound images in the specification but rather broadly recites processing the annotated image and processing the annotated image has been rejected before in the previous office action.

***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary

skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 1, 13 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ikeshoji et al., U.S. Patent No. 5,761,339, further in view of applicant's admitted prior art (here AAA).

Regarding claims 1, 13 and 30, Ikeshoji discloses removing one or more textual annotations from a grayscale annotated image to derive a first modified image (figure 1; **element 20D** being the first modified image, which is obtained after annotations (elements 30, 32 and 34) are removed; **element 30D** represents removed annotations only with no background image where annotations being textual (characters) (See **Title**; figure 1 clearly says image 30D being character and figure image; col. 2, lines 36-42 discloses characters (textual annotations) are drawn on an image).

Ikeshoji further discloses processing said first modified image (20D) using an algorithm to derive a processed image (col. 5, lines 1-5; removing stains).

Ikeshoji further discloses merging the removed one or more annotations with said processed image to derive a merged image (figure 3, element 10-1 being the merged image).

Ikeshoji further teaches "The present invention relates to an image processing method for correction of an image when a natural image such as a photograph or a picture or a document of characters and/or figures drawn on paper is read by an electronic means such as a scanner and recorded on a recording medium or displayed on a display" (col. 1, lines 8-13). Clearly from the all of the above disclosure described, Ikeshoji describes a scanner to obtain an image and then records the images electronically on recording medium and then performs image processing functions on the images with annotations on it as described above but does not expressly teach using these image processing functions of an ultrasound image. The question now is that can Ikeshoji's image processing functions be used on images scanned by ultrasound device? The answer would be

yes because it is a well known fact that any image when stored electronically is prone to any kind of image processing that can be performed electronically and the ultrasound image is just an image like any other normal image when stored electronically and as well known in the art of imaging, ultrasound device is nothing but a scanner that obtains images and then records these images in electronically in the memory and further these images are easily accessible to the operator or user for further processing or displaying and Applicant's admitted prior art further teaches such a medical diagnostic imaging, particularly ultrasound imaging and further teaches saving ultrasound images into the memory and then performing image processing functions to improve the image on which the annotation is burnt in (specification, para 0002-0003), as similarly done by Ikeshoji. Therefore, it would have been obvious for one of ordinary skill in the art at the time of invention was made to combine the teachings of Ikeshoji and applicant's admitted prior art (AAA) because both references are directed to the processing of annotated images and solves the same problem of improving annotated images and Ikeshoji's provides image processing algorithms that can be applied to ultrasound images of AAA since an ultrasound image is just an image like any other image stored electronically and all the images being defined by pixels in electronic format, the same image processing which Ikeshoji applies to the image pixels can be applied to the ultrasound images stored electronically.

8. Claims 2-12, 14-21 and 31-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ikeshoji et al., U.S. Patent No. 5,761,339, further in view of applicant's admitted prior art, and further in view of Macleod et al., U.S. Patent No. 5,778,092, and further in view of Bloomberg, U.S. Patent No. 5,065,437.

**Claim 2** recites “The method as recited in claim 1, wherein said removing step comprises the following: deriving a first binary mask defining one or more image regions; and multiplying said first binary mask and said annotated ultrasound image to derive said modified image”. Ikeshoji clearly teaches in figure 1, deriving a first modified image (element 20 D) from which annotations have been removed with the help of filtering (or masking). Removing a part of images by using a mask is very well known in the process of image segmentation where processing such as convolution further involving multiplying mask bits with original image is used and is generally used in differentiating and removing an image part from the original image. Ikeshoji does teach of using a filter or mask but does not specifically teach deriving a binary mask, however, Macleod teaches this generally used well-known method of deriving a binary mask (col. 2, lines 1-13; col. 4, lines 65-68 through col. 5, lines 1-16 and lines 30-68; col. 8, lines 4-10 and lines 25-40).

Further supporting, in lines 57-62 of col. 11, MacLeod discloses that U.S. Patent No. 5,065,437, is incorporated by reference, thereby, not requiring the motivation to combine the references. Bloomberg. Bloomberg provides the support for subject matter in claim 2 in (figure 1B,col. 2, lines 20-68; col. 4, lines 1-68; col. 6, lines 10-40). Therefore, it would have been obvious for one of ordinary skill in the art at the time of invention was made to use combined teachings of MacLeod and Bloomberg in the invention combined of Ikeshoji and AAA because all references are directed to image segmentation and the combined MacLeod and Bloomberg’s teachings provide the well-known teachings that are generally used in image segmentation, which would further provide a robust and computationally efficient technique for identifying and separating regions (See Bloomberg, col. 2, lines 5-15).

**Claim 3** recites “The method as recited in claim 2, wherein said merging step comprises the following” inverting said first binary mask to derive a second binary mask defining one or more annotation regions; multiplying said second binary mask and annotated ultrasound image to derive a modified image; and merging said modified image and said processed image to derive said merged ultrasound image”. Ikeshoji clearly shows in figure 1, deriving images 20D and 30D, where in image 20D annotations are removed and in image 30D only annotations are present, therefore these 2 images are clearly subject to the apparent use of a mask that when inverted would provide segmentation for extracting one part or the other from the original image. Figure 3 clearly shows merging said second modified image (30) and said processed image (20) to derive said merged image.

**Claim 4** recites “The method as recited in claim 1, wherein the merged textual annotations occupy the same pixels in said merged ultrasound image that the removed textual annotations originally occupied in said annotated ultrasound image”. Ikeshoji clearly shows in figure 3 the image 10-1 which has annotation at the same image position as shown in figure 1 image 10 and further support can be found in (col. 4, lines 6-12).

**Claim 5** recites “the method as recited in claim 1, wherein said removing step comprises morphology-based processing and thresholding”. MacLeod discloses dilation and erosion (morphological operations) (col. 7) and further teaches thresholding (col. 5).

**Claim 6** recites “The method as recited in claim 1, wherein said removing step comprising the following: grayscale erosion of said annotated ultrasound image using a structuring element to derive an eroded image; thresholding said eroded image to derive a first binary mask; dilation of said



first binary mask using said structuring element to derive a second binary mask defining one or more image regions; and multiplying said second binary mask and said annotated ultrasound image to derive said modified ultrasound image”. The subject matter recited in the claim 6 is nothing but a morphological operation (opening: erosion followed by dilation), which is very well-known to be used in the process of identifying and separating image portions. MacLeod clearly teaches all the steps recited in claim 6 in (col. 11 through col. 12, lines 1-55). Bloomberg further provides the support in (col. 9, lines 45-68 through col. 10, lines 1-25).

**Regarding claim 7**, citing the well-known fact of modifying the image using an image mask, and in further view of Ikeshoji providing merging of images as explained before in the rejection of claim 3. Claim 7 has been similarly analyzed and rejected as per claims 3 and 6.

**Regarding claim 8**, MacLeod discloses said removing step comprises thresholding and pixel connectivity-based analysis” (col. 6, lines 44-56). See Bloomberg (col. 2, lines 28-60; col. 4, lines 40-65; col. 7, lines 1-65).

**Regarding claim 9**, claim 9 additionally recites the limitation where “**using 8-connected analysis to reject segments smaller than a prespecified size** from said first binary mask to derive a second binary mask”. MacLeod discloses of the same in (col. 6, lines 44-56; col. 10, lines 1-40). All other limitations have been similarly analyzed and rejected as per claims 1-8.

**Regarding claim 10**, claim 10 has been similarly analyzed and rejected as per claims 9, 7 and 3.

**Regarding claim 11**, claim 11 in addition to claim 9 recites “removing holes from a second binary mask to derive a third binary mask”. MacLeod teaches mask reconstruction for filling (removing) the interior holes (col. 11, lines 63-68 through col. 12, lines 1-15).

**Regarding claim 12**, Ikeshoji discloses filtering to enhance said modified ultrasound image (col. 6, lines 10-20).

**Claims 14-21** have been similarly analyzed and rejected as per claims 2-12.

**Claim 31 and 32** have been similarly analyzed and rejected as per claims 2-3.

9. Claims 22-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ikeshoji et al., U.S. Patent No. 5,761,339, further in view of applicant’s admitted prior art, and further in view of Macleod et al., U.S. Patent No. 5,778,092, and further in view of Bloomberg, U.S. Patent No. 5,065,437 and further in view of Gonzales et al., 1992, Book publication “Digital image processing”.

As discussed before in the rejection of claims 1-12, the combined invention of Ikeshoji, AAA, MacLeod and Bloomberg provides techniques that are used on grayscale images. Now the question is, can the same techniques be used on color images? The answer would be yes and further support is provided by Gonzales. Gonzales teaches “the HIS model is ideally suited for image enhancement, because the intensity component is decoupled from the color information in an image. Therefore any monochrome enhancement technique can be carried over as a tool for enhancing full-color images. It simply calls for converting the image to the HIS format, processing

Art Unit: 2624

the intensity component, and converting the result to RGB for display” (page 247, 4<sup>th</sup> paragraph) and apparently the HS components would have to be merged back in as the processing is done on color images and the output required would be a color image. Also, converting an RGB to HSI and HSI to RGB model is very well known and is further taught by Gonzales on page 229 and 235. Therefore, providing a motivation for one of ordinary skill in the art at the time of invention was made to combine Gonzales’s teachings in the combined invention of Ikeshoji, AAA, MacLeod and Bloomberg. All other limitations of claims 22 and 26 have been similarly analyzed and rejected as per claims 1-12.

**Claims 23-24 and 27-28** have been similarly analyzed and rejected as per claims 2-3, 22 and 26.

**Claims 25 and 29** have been similarly analyzed and rejected as per claims 22 and 26.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Manav Seth whose telephone number is (571) 272-7456. The examiner can normally be reached on Monday to Friday from 8:30 am to 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bhavesh Mehta, can be reached on (571) 272-7453. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



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Manav Seth  
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July 26, 2006